WHAT IS CLAIMED IS:

1. An exposure apparatus comprising:

a projection optical system having a predetermined image forming characteristic;

a mask stage, arranged on one side of said projection optical system, for holding a mask substrate and having a reference plate;

a wafer stage, arranged on the other side of said projection optical system, for holding a wafer and having a reference mark;

an optical modulation member for influencing an image forming relation between the mask substrate and the wafer, when the pattern on the mask substrate is transferred to the wafer through said projection optical system; and

an adjusting unit for substantially matching an image forming relation between the reference plate and the reference mark to the image forming relation between the mask substrate and the wafer, which has been influenced by said optical modulation member, when positions of the reference plate and the reference mark are detected through an optical path of said projection optical system for positioning the mask substrate and the wafer.

2. The exposure apparatus according to claim 1,

wherein said optical modulation member is configured with a pellicle for protecting the mask substrate, and an optical device for correcting an aberration of said projection optical system, and

said adjusting unit is a correction optical device arranged between the reference plate and said projection optical system for apparatus calibration or wafer positioning,

wherein said correction optical device has an equal thickness to a total thickness of the pellicle and the optical device which constitute said optical modulation member.

3. The exposure apparatus according to claim 2, wherein in said optical modulation member, a combination of the pellicle and the optical device is determined so that the total thickness of the pellicle and the optical device is constant.

4. The exposure apparatus according to claim 2, wherein said correction optical device is formed into a partially processed shape or an aspherical shape so as to correct the aberration at the pupil position of said projection optical system.

5. The exposure apparatus according to claim 1, wherein said adjusting unit is realized by providing a

predetermined difference between a pattern surface position of the mask substrate that faces said projection optical system and a surface position of the reference plate that faces said projection optical system, in an optical axis direction of said projection optical system.

6. The exposure apparatus according to claim 5, wherein said optical modulation member is configured with at least one of a pellicle for protecting the mask substrate, and an optical device for correcting an aberration of said projection optical system,

wherein the predetermined difference Tsp is expressed by

$$Tsp = Tp \times (1-1/Np) + Tg \times (1-1/Ng)$$

where Tp represents a thickness of the pellicle, Np represents a refractive index, Tg represents a thickness of the optical device, and Ng represents a refractive index.

7. The exposure apparatus according to claim 1, wherein said adjusting unit is realized by providing a predetermined difference between a wafer surface position that faces said projection optical system and a surface position of the reference mark that faces said projection optical system, in an optical axis direction of said proj ction optical syst m.

8. The exposure apparatus according to claim 7, wherein the predetermined difference is provided by driving the wafer stage in the optical axis direction when apparatus calibration is performed.

9. The exposure apparatus according to claim 8, wherein said optical modulation member is configured with at least one of a pellicle for protecting the mask substrate, and an optical device for correcting an aberration of said projection optical system,

wherein the predetermined difference Twp is expressed by

$$Twp = Tp\times(1-1/Np)/\beta^2 + Tg\times(1-1/Ng)/\beta^2$$

where Tp represents a thickness of the pellicle, Np represents a refractive index, Tg represents a thickness of the optical device, Ng represents a refractive index, and β represents an image forming magnification of said projection optical system.

10. The exposure apparatus according to claim 1, wherein said exposure apparatus is a scanning projection exposure apparatus.